NON-LINEAR SPIN-WAVE RADIATION IN SPIN-TORQUE NANOCONTACT DEVICES

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The behavior of the magnetization in spin torque oscillators is of great interest not only for the possible industrial applications of those devices like integrated electronics and in telecommunications, but also for the fundamental understanding of the physical processes which take place in such devices.

Using the Brillouin light scattering microscopy we have investigated the dynamics of the magnetization in the Py free layer of one spin-valve structure with a point contact with 80 nm in diameter. The magnetic resonance frequencies are determined for different externally applied magnetic fields. The spin-waves radiation from the contact are studied for several applied microwave frequencies and under the influence of an applied dc current as well as a function of the applied power from the microwave source. The results reveal strong nonlinear effects namely the generation of eigenmodes with higher frequency (2*f*, 3*f*) but also modes with a non integer-factor (0.5*f*, 1.5 *f*) in respect with the excitation microwave frequency (*f*). These non-integer factor modes are assumed to be associated with three-magnon-scattering processes. In order to localize those eigenmodes around the nanocontact we have performed 2D scans with a high spatial resolution and the obtained patterns shows that half and second harmonic modes are strongly localized within the point contact area. Tuning the dc current the efficiency of the magnon spliting can be strongly enhanced or reduced.

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